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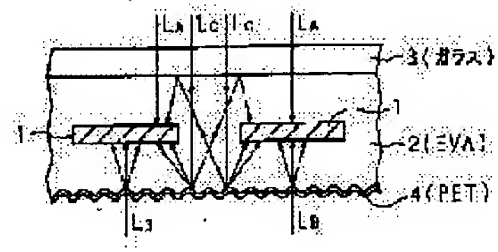
(71)Applicant : SANYO ELECTRIC CO LTD
(72)Inventor : SAKATA HITOSHI
KADONAGA YASUO
MURATA KENJI

(54) SOLAR CELL MODULE

(57)Abstract:
PROBLEM TO BE SOLVED: To efficiently utilize lights entering the regions among adjoining solar cells and improve the power generation efficiency.
SOLUTION: This solar cell module is provided with a plurality of both- surface light incident type solar cells 1 which are arranged with an interval in distance in an ethylene vinyl acetate(EVA) layer 2, a glass plate 3 on the surface side of module to which more lights enter, and a light-transmitting sheet 4 whose surface has raggedness and which is made of EVA on the backside of module where less incident light enters. The incident lights which enter the region, in which the solar cell 1 exists from the surface and backsides of module through the glass plate 3 and the light-transmitting sheet 4, enter the surface and backsides thereof a they are in the solar cell 1. A part of incident light entering the region between the adjoining solar cells 1 and 1 from the surface side of module via the glass plate 3 is scattered by the light- transmitting sheet 4, and a part thereof enters the solar cell 1 from the backside thereof, and furthermore the other part thereof reflects on the boundary surface between the EVA layer 2 and glass plate 3 and enters the solar cell 1 from the surface side thereof.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the solar cell module equipped with the solar-battery cell of two or more double-sided light incoming radiational types.
[0002]
[Description of the Prior Art] There are a pedion light incoming radiational type which is wearing a rear face with the film which does not penetrate light, and uses the incident light only from the front-face side of a solar-battery cell for power generation, and a double-sided light incoming radiational type which uses each incident light from the front-face side of a solar-battery cell and a rear-face side for power generation using a film transparent at the rear face in the solar cell module equipped with two or more solar-battery cells. If the solar cell module of both molds is installed on the same conditions and the electromotive force property is investigated, compared with the solar cell module of a pedion light incoming radiational type, as for the solar cell module of a double-sided light incoming radiational type, the result of the improvement in an output of about 5 - 10% will be obtained.
[0003] Drawing 12 is the cross section of such a conventional solar cell module. In drawing, 1 is the solar-battery cell of the double-sided light incoming radiational type which forms an amorphous-semiconductor layer in the substrate which consists for example, of a crystal system semiconductor, constitutes semiconductor junction between a crystal system substrate and an amorphous-semiconductor layer, forms a translucency electric conduction film and a collector in a front-face and rear-face side, and generates photoelectromotive force by the optical incidence from the both sides of a front face and a rear face.
[0004] It is embedded in the EVA (ethylene vinyl acetate) layer 2 in the state where such two or more solar-battery cells 1 have separated and arranged a distance predetermined in ****** cells. Moreover, the glass plate 3 which consists of tempered glass is formed in the front-face side of the EVA layer 2, and the rear-face film 40 transparent [the whole surface] or opaque is formed in the rear-face side of the EVA layer 2. In this case, when using the rear-face film 40 flat [the whole surface] and transparent when using the incident light from a rear-face side for power generation and not using the incident light from a rear-face side for power generation, the whole surface uses the flat and opaque rear-face film 40.
[0005]
[Problem(s) to be Solved by the Invention] The arrow mark in drawing 12 shows the path of the incident light in the conventional solar cell module with which the whole surface used the transparent rear-face film 40. Although incidence of the light by which incidence was carried out to the field to which the solar-battery cell 1 exists from the front-face or rear-face side is carried out to the solar-battery cell 1 and it can contribute to electromotive force generating, the field 1 where the solar-battery cell 1 does not exist, i.e., a ****** solar-battery cell, and the light by which incidence was carried out to the field between one pass the rear-face film 40 transparent as it is, without carrying out incidence to the solar-battery cell 1. Therefore, in the conventional solar cell module, the light by which incidence is carried out to the field between ****** solar-battery cells cannot be used effectively, but a generating efficiency is bad and there is a problem of a low in output voltage.
[0006] this invention is made in view of this situation, the light which carried out incidence to the field

between ****** solar-battery cells can be used effectively, and it aims at offering the solar cell module which can aim at improvement in a generating efficiency.
[0007]
[Means for Solving the Problem] The solar cell module concerning a claim 1 is characterized by equipping one optical modular incidence side with the light-scattering member of a translucency in the solar cell module equipped with the solar-battery cell of two or more double-sided incoming radiational types which carried out isolation arrangement.
[0008] The solar cell module concerning a claim 2 is characterized by equipping one optical modular incidence side with the translucent part material which gave concavo-convex processing to the front face in the solar cell module equipped with the solar-battery cell of two or more double-sided incoming radiational types which carried out isolation arrangement.
[0009] The solar cell module concerning a claim 3 is characterized by equipping an optical modular [both] incidence side with the translucent part material which gave concavo-convex processing to the front face in the solar cell module equipped with the solar-battery cell of two or more double-sided incoming radiational types which carried out isolation arrangement.
[0010] The solar cell module concerning a claim 4 is characterized by a concavo-convex interval being less than 1 time of the interval of a ****** solar-battery cell in the aforementioned translucent part material in claims 2 or 3.
[0011] The solar cell module concerning a claim 5 is characterized by the rate of haze in the aforementioned translucent part material being 20% or more in claims 2 or 3.
[0012] The solar cell module concerning a claim 6 is characterized by equipping a part of aforementioned translucent part material with a light reflex member corresponding to the field between ****** solar-battery cells in a claim 2.
[0013] the solar cell module concerning a claim 7 -- a claim 6 -- setting -- the aforementioned light reflex -- width of face of a member is characterized by being 1 of the interval of a ****** solar-battery cell - double precision
[0014] The solar cell module concerning a claim 8 is set they to be [any of claims 2-5], and is characterized by giving larger convex processing than other portions to the portion corresponding to the field between ****** solar-battery cells in the aforementioned translucent part material.
[0015] The solar cell module concerning a claim 9 is characterized by equipping one optical modular incidence side with the light reflex member prepared corresponding to the field where the aforementioned solar-battery cell exists, and the light-scattering member prepared corresponding to the field between ****** solar-battery cells in the solar cell module equipped with the solar-battery cell of two or more double-sided incoming radiational types which carried out isolation arrangement.
[0016] In the solar cell module equipped with the solar-battery cell of two or more double-sided incoming radiational types which carried out isolation arrangement, the solar cell module concerning a claim 10 reflects in a module the light which carries out incidence from one optical modular incidence side, and passes through the inside of a module, and is characterized by to equip the optical incidence side of modular another side with the member which are scattered about and moreover puts in in a module the light which carries out incidence from the optical incidence side of modular another side.
[0017] In the solar cell module of this invention, the translucent part material over which light is scattered, for example, the translucent part material which gave concavo-convex processing to the front face, is prepared at the rear-face side which is one optical modular incidence side. The incident lights which passed through between ****** solar-battery cells from the modular front-face side are scattered about by the translucent part material by the side of a rear face, and incidence of a part of the scattered light is carried out to a solar-battery cell. Therefore, in the conventional example, the incident light which was not used can be used effectively and a photoelectric conversion efficiency improves.
[0018] Moreover, if the translucent part material over which light is scattered is prepared also in a modular front-face side, it will be scattered about by the translucent part material by the side of a front face, incidence of a part of the scattered light will be carried out to a solar-battery cell, and the incident light of a photoelectric conversion efficiency which passed through between ****** solar-battery cells from the modular rear-face side will also improve further.
[0019] In the solar cell module which has the composition which equipped the modular rear-face side

with the translucent part material which gave such concavo-convex processing, or it makes into 20% or more the rate of haze of the translucent part material which makes the interval of the irregularity in translucent part material less than 1 time of the interval of a ****** solar-battery cell, compared with the case where it is not made such, a scattering effect can be enlarged more by giving large convex processing to translucent part material corresponding to the field between ****** solar-battery cells.
[0020] Moreover, in the solar cell module which has the composition which equipped the modular rear-face side with the translucent part material which gave such concavo-convex processing, if the portion of the translucent part material corresponding to the field between ****** solar-battery cells is equipped with a light reflex member, it will be more efficient and the incidence of the light which passed through between ****** solar-battery cells from the modular front-face side can be carried out in a solar-battery cell. however, a light reflex -- if width of face of a member is enlarged, since the light which carries out incidence to the field where a solar-battery cell exists from a modular rear-face side will be intercepted, the width of face has 1 of the interval of a ****** solar-battery cell - good double precision
[0021] Other solar cell modules of this invention have prepared the light-scattering member for the light reflex member corresponding to the field between ****** solar-battery cells corresponding to the field where a solar-battery cell exists in a modular rear-face side. The incident lights which passed through between ****** solar-battery cells from the modular front-face side are scattered about by the light-scattering member by the side of a rear face, and after being reflected by the light reflex member, incidence of them is carried out from the rear-face side into a solar-battery cell. Therefore, in the conventional example, the incident light which was not used can be used effectively and a photoelectric conversion efficiency improves.
[0022] The solar cell module of further others of this invention reflected the light which passed through the inside of a module from the modular front-face side, and the member scattered about in the incident light from a modular rear-face side is prepared in the modular rear-face side. After being reflected by the member by the side of a rear face, incidence of the incident light which passed through between ****** solar-battery cells from the modular front-face side is carried out from the rear-face side into a solar-battery cell. Moreover, the light by which incidence will be carried out to the field between ****** solar-battery cells from a modular rear-face side if it goes straight on is scattered about by the member, and incidence is carried out from the rear-face side into a solar-battery cell. Therefore, in the conventional example, the incident light which was not used can be used effectively and a photoelectric conversion efficiency improves.
[0023]
[Embodiments of the Invention] Hereafter, this invention is concretely explained with reference to the drawing in which the gestalt of the operation is shown. In addition, in the following explanation, one optical incidence side of the module in a claim points out the rear-face side of a solar cell module.
(Form of the 1st operation) Drawing 1 is the cross section of the solar cell module by the form of the 1st operation of this invention. In drawing, 1 is the solar-battery cell of a double-sided light incoming radiational type, and the solar-battery cell 1 (thickness : 0.1-0.7mm) of two or more double-sided light incoming radiational types is in the state which separated a distance (1mm or more) predetermined in ****** cells, and has been arranged, and it is embedded in the EVA layer 2 (thickness :mm [0.2-3], a refractive index : 1.5). Moreover, the glass plate 3 (refractive index : 1.5) which consists of white-board tempered glass is formed, and the translucent sheet 4 (thickness :mm [0.05-0.2], a refractive index : about 1.5) made from PET (polyethylene tele phthalate) or PVF (polyvinyl fluoride) for which concavo-convex processing was given to the front face is formed in the rear-face side of the EVA layer 2 at the front-face side of the EVA layer 2, for example.
[0024] Drawing 2 is the block diagram showing an example of the solar-battery cell 1 of a double-sided light incoming radiational type. In drawing 2 , 11 is an n type crystal system silicon substrate which consists of crystal system semiconductors, such as single crystal silicon and polycrystal silicon. On one principal plane (front face) of the crystal system silicon substrate 11, the laminating of the i type amorphous silicon layer 12 and the p type amorphous silicon layer 13 is carried out to this order, and the collector 15 of the comb configuration which consists of the translucency electric conduction film 14 and Ag which consist of ITO is further formed on it. On the principal plane (rear face) of another side of the crystal system silicon substrate 11, the laminating of the i type amorphous silicon layer 16 and the n type

amorphous silicon layer 17 is carried out to this order, and the collector 19 of the comb configuration which consists of the translucency electric conduction film 18 and Ag which consist of ITO is further formed on it.

[0025] The solar cell module of such structure is manufactured by carrying out the laminating of the EVA sheet used as the EVA sheet used as a glass plate 3 and the EVA layer 2, two or more solar-battery cells 1, and the EVA layer 2, and the translucent sheet 4 which gave concavo-convex processing to this order, performing heating sticking-by-pressure processing to the layered product, and making it unite with it. In addition, it is efficient to produce such a translucent sheet 4 that has irregularity in a front face by mold push with the concavo-convex processing roller to a flat EVA sheet which has irregularity in a processing side.

[0026] Next, how depending on which the incident light in the form of this 1st operation progresses is explained with reference to drawing 1 . Incidence of the incident light (arrow mark LA) by which incidence is carried out to the field to which the solar-battery cell 1 exists through a glass plate 3 from a modular front-face side is carried out from the front-face side into the solar-battery cell 1 as it is. Moreover, parts are scattered about and incidence of the incident light (arrow mark LB) by which incidence is carried out to the field to which the solar-battery cell 1 exists through a translucent sheet 4 from a modular rear-face side is carried out from the rear-face side into the solar-battery cell 1 as it is.

[0027] A part of incident lights (arrow mark LC) by which incidence is carried out to the ****** solar-battery cell 1 and the field between one, i.e., the field to which the solar-battery cell 1 does not exist, through a glass plate 3 on the other hand from a modular front-face side are scattered about by the translucent sheet 4. And incidence of a part of scattered light is carried out from the rear-face side into the solar-battery cell 1. Moreover, after being reflected by the interface of the EVA layer 2 and a glass plate 3, incidence of a part of scattered light is carried out from the front-face side into the solar-battery cell 1.

[0028] Thus, since not only the incident light to the field where the solar-battery cell 1 exists from a modular front-face and rear-face side but the incident light to the field between the ****** solar-battery cell 1 and 1 can be contributed to electromotive force generating, a photoelectric conversion efficiency improves. With the form of this 1st operation, improvement in an output of about 2% can be aimed at as compared with the conventional example which used the flat and transparent rear-face film 40 shown in drawing 12 .

[0029] Here, the relation between the interval of the ****** solar-battery cells 1 and 1 and the interval of the irregularity formed in a translucent sheet 4 is explained. When a concavo-convex interval is larger than the interval of the solar-battery cells 1 and 1, as shown in drawing 3 , the width of face of the crevice of a translucent sheet 4 becomes larger than the interval of the solar-battery cells 1 and 1, and the crevice will cover the whole region between the solar-battery cell 1 and 1. in such a case -- ****** -- a solar battery -- a cell -- one -- one -- between -- a field -- a front face -- a side -- from -- a glass plate -- three -- minding -- incidence -- carrying out -- having -- an incident light (arrow mark LD) -- most -- the scattered light -- again -- a solar battery -- a cell -- one -- one -- between -- a field -- a passage -- a solar battery -- a cell -- one -- inside -- incidence -- carrying out -- not having . Consequently, the scattered light by which incidence is carried out from the rear-face side into the solar-battery cell 1 decreases. Therefore, it is desirable for at least one heights to exist in the field between the solar-battery cell 1 and 1. Therefore, a concavo-convex interval uses the translucent sheet 4 which gave concavo-convex processing so that it may become less than 1 time of the interval of the ****** solar-battery cells 1 and 1. If such a translucent sheet 4 is used, at least one heights surely exist in the field between the ****** solar-battery cell 1 and 1, and the incident light from a front-face side in the meantime can be used effectively.

[0030] Thus, although considering as the irregularity of a minute pattern is desirable as for the irregularity in a translucent sheet 4 in order to carry out scatter reflection, when the formation pitch becomes not much narrow, there are translucence (nebula) and a bird clapper and irregularity may be formed in a big pitch on a fine sight. Also in this case, as for an output, the direction where it was made for heights to exist in the field between the ****** solar-battery cell 1 and 1 becomes high.

[0031] Next, the relation between the rate of haze of a translucent sheet 4 and output characteristics is explained. the rate of haze showing the grade of the light-scattering effect (%) is defined by following the (1) type, and a total transmittance (%) is defined by the average permeability in a visible region (400-700nm)

Rate =of haze {(dispersion permeability of light)/(total transmittance of light)} x100 -- (1)
However, dispersion permeability of light : (total transmittance) - (straight-line permeability)
The total transmittance of light: Permeability to all the transmitted lights measured using the integrating sphere [0032] Drawing 4 is a graph which shows the relation between the rate of haze of a translucent sheet 4 (horizontal axis), and a short-circuit current Isc (vertical axis). When the short-circuit current Isc is increasing and the rate of haze exceeds 20% as the rate of haze becomes large until the rate of haze reaches to 20%, it turns out that a short-circuit current Isc hardly changes. Therefore, output characteristics can be improved more by using the translucent sheet 4 to which the rate of haze exceeds 20%.
[0033] (Form of the 2nd operation) Drawing 5 is the cross section of the solar cell module by the form of the 2nd operation of this invention. In drawing 5 , the same number is given to the same portion as drawing 1 , and those explanation is omitted. Concavo-convex processing is given to the front-face side of a solar cell module as well as a rear-face side with the form of the 2nd operation. That is, with the form of the 2nd operation, the front face of a glass plate 3 is not flat, and concavo-convex processing is given. Other composition is the same as that of the form of the 1st above-mentioned operation. The form of the 2nd operation can also be manufactured by the same heating sticking-by-pressure processing as the form of the 1st operation.
[0034] Next, how depending on which the incident light in the form of this 2nd operation progresses is explained with reference to drawing 5 . Parts are scattered about and incidence of the incident light (arrow mark LE) by which incidence is carried out to the field to which the solar-battery cell 1 exists through a glass plate 3 from a modular front-face side is carried out from the front-face side into the solar-battery cell 1 as it is. Moreover, parts are scattered about and incidence of the incident light (arrow mark LF) by which incidence is carried out to the field to which the solar-battery cell 1 exists through a translucent sheet 4 from a modular rear-face side is carried out from the rear-face side into the solar-battery cell 1 as it is.
[0035] A part of incident lights (arrow mark LG) by which incidence is carried out from a modular front-face side on the other hand towards the ****** solar-battery cell 1 and the field between one, i.e., the field where the solar-battery cell 1 does not exist, are scattered about by the glass plate 3. Incidence of a part of the scattered light is carried out from the front-face side into the solar-battery cell 1 as it is. Moreover, a part of rectilinear-propagation light is scattered about by the translucent sheet 4. And incidence of a part of the scattered light is carried out from the rear-face side into the solar-battery cell 1.
[0036] Thus, since not only the incident light to the field where the solar-battery cell 1 exists from a modular front-face and rear-face side but the incident light to the field between the ****** solar-battery cell 1 and 1 can be contributed to electromotive force generating, a photoelectric conversion efficiency improves and, moreover, the scatter reflection of light happens to high frequency compared with the form of the 1st operation, and it is the light in a module. With the form of this 2nd operation, improvement in an output of about 3% can be aimed at as compared with the conventional example which used the flat and transparent rear-face film 40 shown in drawing 12 .
[0037] (Form of the 3rd operation) Drawing 6 is the cross section of the solar cell module by the form of the 3rd operation of this invention. In drawing 6 , the same number is given to the same portion as drawing 1 , and those explanation is omitted. With the form of the 3rd operation, the high reflective film 5 (thickness : 100-5000A) made from Ag is formed in the ****** solar-battery cell 1 and the portion corresponding to the field between one in the translucent sheet 4 by which concavo-convex processing was given to the front face. This high reflective film 5 is formed somewhat more greatly than the field, completely including the field between the solar-battery cell 1 and 1. Other composition is the same as that of the form of the 1st above-mentioned operation.
[0038] In addition, if the high reflective film 5 carries out material, high reflective metals, such as Au and aluminum, can be used in addition to Ag. Moreover, you may use the material which gave white processing to polymeric materials, such as PVF and PET, for the high reflective film 5.
[0039] Next, how depending on which the incident light in the form of this 3rd operation progresses is explained with reference to drawing 6 . Incidence of the incident light (arrow mark LH) by which incidence is carried out to the field to which the solar-battery cell 1 exists through a glass plate 3 from a modular front-face side is carried out from the front-face side into the solar-battery cell 1 as it is.

Moreover, parts are scattered about and incidence of the incident light (arrow mark LI) by which incidence is carried out to the field in which the high reflective film 5 is not formed through a translucent sheet 4 from a modular rear-face side is carried out from the rear-face side into the solar-battery cell 1 as it is.

[0040] The incident light (arrow mark LJ) by which incidence is carried out to the ****** solar-battery cell 1 and the field between one, i.e., the field to which the solar-battery cell 1 does not exist, through a glass plate 3 on the other hand from a modular front-face side is reflected by the high reflective film 5. Incidence of a part of reflected light is carried out from the rear-face side into the solar-battery cell 1.

[0041] Thus, since not only the incident light to the field where the solar-battery cell 1 exists from a modular front-face and rear-face side but the incident light to the field between the ****** solar-battery cell 1 and 1 can be contributed to electromotive force generating, a photoelectric conversion efficiency improves.

[0042] Here, the relation between the arrangement width of face of the high reflective film 5 and output characteristics is explained. Although what is necessary is just to set the arrangement width of face of the high reflective film 5 as the same grade as the interval of the solar-battery cells 1 and 1 about the light which carries out incidence to an abbreviation perpendicular to a modular front face, as shown also in drawing 6 , about the incident light (arrow mark LK) which carries out incidence from across to a modular front face, larger arrangement width of face than the interval of the solar-battery cells 1 and 1 is required. However, if arrangement width of face of the high reflective film 5 is enlarged too much, the range which intercepts the light by which incidence is carried out from a modular rear-face side will become large, and it will be thought that output characteristics deteriorate conversely.

[0043] Drawing 7 is a graph which shows the relation of the arrangement width of face (horizontal axis) of the high reflective film 5 and the short-circuit current Isc (vertical axis) to the interval of the solar-battery cells 1 and 1. When the short-circuit current Isc is increasing and arrangement width of face exceeds the double precision of a cell interval as the arrangement width of face becomes large until the arrangement width of face of the high reflective film 5 reaches the double precision of the interval of the solar-battery cells 1 and 1, it turns out that a short-circuit current Isc falls to ****. Therefore, output characteristics can be improved more by installing the high reflective film 5 by the width of face of 1 - double precision of the interval of the solar-battery cells 1 and 1.

[0044] (Form of the 4th operation) Drawing 8 is the cross section of the solar cell module by the form of the 4th operation of this invention. In drawing 8 , the same number is given to the same portion as drawing 1 , and those explanation is omitted. With the form of the 4th operation, in the translucent sheet 4 to which concavo-convex processing was given, a concavo-convex pattern is not equal on a front face, and big heights 4a is formed in it compared with the field where the solar-battery cell 1 exists in the solar-battery cell 1 and the portion corresponding to the field between one. Other composition is the same as that of the form of the 1st above-mentioned operation.

[0045] In addition, as the nose of cam may be sharp as shown in drawing 8 , and the configuration of heights 4a formed corresponding to the field between the solar-battery cell 1 and 1 is shown in drawing 9 (a) and (b), the nose of cam may be roundish.

[0046] In addition, by carrying out the laminating of the EVA sheet used as the EVA sheet used as a glass plate 3 and the EVA layer 2, two or more solar-battery cells 1, and the EVA layer 2, and the translucent sheet 4 which gave concavo-convex processing, performing heating sticking-by-pressure processing to the layered product, and making it unite with it Although the solar cell module of such structure is manufactured At the time of this heating sticking-by-pressure processing, by pressing against a translucent sheet 4 the solar-battery cell 1 and the force piston which has a field between one, and two or more salients in this pitch, it is made to correspond to the field between the solar-battery cell 1 and 1, and big heights 4a is formed alternatively.

[0047] Since big heights 4a in this way was alternatively formed in the translucent sheet 4 of the portion which needs a scattering effect with the form of the 4th operation The incident light (arrow mark LM) by which incidence is carried out to the ****** solar-battery cell 1 and the field between one, i.e., the field to which the solar-battery cell 1 does not exist, through a glass plate 3 from a modular front-face side While it becomes possible for you to make it scattered about at more a rate compared with the form of other operations, the probability which carries out total reflection by the rear-face side becomes high.

[0048] (Form of the 5th operation) Drawing 10 is the cross section of the solar cell module by the form of the 5th operation of this invention. In drawing 10 , the same number is given to the same portion as drawing 1 , and those explanation is omitted. light scattering which is from glass, a polycarbonate, an acrylic, etc. on the rear-face side of a solar cell module in the field between the ****** solar-battery cell 1 and 1 with the form of the 5th operation -- the member 6 was formed and the reflecting plate 7 which consists of thermal reflex glass is formed in the field to which the solar-battery cell 1 exists Other composition is the same as that of the form of the 1st above-mentioned operation.
[0049] Next, how depending on which the incident light in the form of this 5th operation progresses is explained with reference to drawing 10 . Incidence of the incident light (arrow mark LN) by which incidence is carried out to the field to which the solar-battery cell 1 exists through a glass plate 3 from a modular front-face side is carried out from the front-face side into the solar-battery cell 1 as it is. Moreover, incidence of the incident light (arrow mark LO) by which incidence is carried out to the field to which the solar-battery cell 1 exists through a reflecting plate 7 from a modular rear-face side is carried out from the rear-face side into the solar-battery cell 1 as it is.
[0050] the incident light (arrow mark LP) by which incidence is carried out from a modular front-face side on the other hand towards the ****** solar-battery cell 1 and the field between one, i.e., the field where the solar-battery cell 1 does not exist, -- light scattering -- it is scattered about by the member 6, and after being reflected by the reflecting plate 7, incidence of a part of the scattered light is carried out from the rear-face side into the solar-battery cell 1
[0051] Thus, since not only the incident light to the field where the solar-battery cell 1 exists from a modular front-face and rear-face side but the incident light to the field between the ****** solar-battery cell 1 and 1 can be contributed to electromotive force generating, a photoelectric conversion efficiency improves.
[0052] (Form of the 6th operation) Drawing 11 is the cross section of the solar cell module by the form of the 6th operation of this invention. In drawing 11 , the same number is given to the same portion as drawing 1 , and those explanation is omitted. With the form of the 6th operation, the transparent rear-face material 8 (refractive index : about 1.5) of high refraction which consists of a polycarbonate is formed in the rear-face side of a solar cell module. This rear-face material 8 has the shape of toothing, the formation pitch of the irregularity is the half of the arrangement pitch of the solar-battery cell 1, and the position of the crevice 8a corresponds to the ****** solar-battery cell 1, and the field between one and the center section of each solar-battery cell 1. Other composition is the same as that of the form of the 1st above-mentioned operation.
[0053] Next, how depending on which the incident light in the form of this 6th operation progresses is explained with reference to drawing 11 . Incidence of the incident light (arrow mark LQ) by which incidence is carried out to the field to which the solar-battery cell 1 exists through a glass plate 3 from a modular front-face side is carried out from the front-face side into the solar-battery cell 1 as it is. Moreover, parts are scattered about and incidence of the incident light (arrow mark LR) by which incidence is carried out to the field to which the solar-battery cell 1 exists through the rear-face material 8 from a modular rear-face side is carried out from the rear-face side into the solar-battery cell 1 as it is.
[0054] The incident light (arrow mark LS) by which incidence is carried out from a modular front-face side on the other hand towards the ****** solar-battery cell 1 and the field between one, i.e., the field where the solar-battery cell 1 does not exist, is reflected multiply by the rear-face material 8, and incidence of the reflected light is carried out from the rear-face side into the solar-battery cell 1. Moreover, the incident lights (arrow mark LT) by which incidence is carried out from a modular rear-face side towards the ****** solar-battery cell 1 and the field between one, i.e., the field where the solar-battery cell 1 does not exist, are scattered about by the rear-face material 8, and incidence of a part of the scattered light is carried out from the rear-face side into the solar-battery cell 1.
[0055] Thus, since not only the incident light to the field where the solar-battery cell 1 exists from a modular front-face and rear-face side but the incident light to the field between the ****** solar-battery cell 1 and 1 can be contributed to electromotive force generating, a photoelectric conversion efficiency improves.
[0056]
[Effect of the Invention] As mentioned above, with the solar cell module of this invention, since the

translucent part material over which light is scattered was prepared in the modular rear-face side, in the conventional example by which incidence is carried out between the fields between ****** solar-battery cells, the incident light which was not used can be used effectively and a photoelectric conversion efficiency can be raised.

[Translation done.]